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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/029,145	12/28/2001	Jung Il Kim	0465-0882P-SP	5232

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EXAMINER

QI, ZHI QIANG

ART UNIT PAPER NUMBER

2871

DATE MAILED: 03/21/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/029,145

Applicant(s)

KIM ET AL.

Examiner

Mike Qi

Art Unit

2871

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 8 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant admitted prior art in view of US 6,433,842 (Kaneko et al).

Claim 1, Applicant admitted prior art discloses (paragraphs 05 – 26; Figs.1-2) that an LCD device comprising:

- substrate (1);
- TFT having gate electrode (2a) and source (6)/drain (7) electrodes on the substrate (1);
- passivation film (8) formed on an entire surface of the substrate (1) and having contact hole (8a) in the drain electrode (7) of the TFT;
- pixel electrode (9a) connected to the drain electrode (7) through the contact hole (8a).

Applicant admitted prior art does not disclose the pixel electrode made of an amorphous transparent conductive film.

However, Kaneko discloses (col.5, lines 47-51) that amorphous indium tin oxide (a-ITO) or indium zinc oxide (IZO) (amorphous transparent conductive film) allows for use of a weak-acid etchant is preferably used as the material of the pixel electrodes so

that the aluminum alloy (the electrodes under the pixel electrode) is prevented from being damaged during etching of the pixel electrodes.

Therefore, it would have been obvious to those skilled in the art at the time the invention was made to use a pixel electrode made of an amorphous transparent conductive film as claimed in claim 1 for use of a weak-acid etchant so that the electrodes under the pixel electrode such as aluminum alloy is prevented from being damaged such as erosion during etching of the pixel electrodes and improving the pixel electrode contacting the electrode underneath.

Claim 8, Applicant admitted prior art discloses (paragraphs 05 – 26; Figs.1-2) that a pad structure of an LCD device comprising:

- substrate (1);
- gate electrode (2a) made from metal such as Al, Cr, or Al alloy (metal film) is formed on the substrate (1);
- pixel electrode (9a) formed on the metal film, i.e., the gate electrode (2a) forming film.

Applicant admitted prior art does not expressly discloses an amorphous transparent conductive film (forming the pixel electrode) formed on the metal film.

However, Kaneko discloses (col.5, lines 47-51) that amorphous indium tin oxide (a-ITO) or indium zinc oxide (IZO) (amorphous transparent conductive film) allows for use of a weak-acid etchant is preferably used as the material of the pixel electrodes so that the aluminum alloy (the electrodes under the pixel electrode) is prevented from being damaged during etching of the pixel electrodes.

Therefore, it would have been obvious to those skilled in the art at the time the invention was made to use an amorphous transparent conductive film to form the pixel electrode on the metal film as claimed in claim 8 for use of a weak-acid etchant so that the electrodes under the pixel electrode such as aluminum alloy is prevented from being damaged such as erosion during etching of the pixel electrodes and improving the pixel electrode contacting the electrode underneath.

Claim 17, Applicant admitted prior art discloses (paragraphs 05 – 26; Figs.1-2) that a method for manufacturing an LCD device comprising:

- forming a gate line (100) including a gate electrode (2a) and gate pad (2b) on a lower substrate (1);
- forming a gate insulating film (3) on the entire surface of the substrate (1);
- forming a semiconductor film (4) above the gate electrode (2a);
- forming a data line (200) including a data pad (2c) to form source and drain electrodes (6,7) of a TFT at both sides above the semiconductor film (4);
- forming a passivation film (8) on the entire surface of the substrate (1);
- forming contact holes (such as 8a, 8b) in the drain electrode (7), the gate pad (2b) and the data pad (2c) of the TFT;
- forming transparent conductive film such as ITO film, in each pixel region, such as 9a, 9b, connected to the drain electrode (7), the gate pad (2b) and the data pad (2c) through contact holes (such as 8a, 8b).

Applicant admitted prior art does not expressly disclose forming amorphous transparent conductive film in each pixel region.

using

However, Kaneko discloses (col.5, lines 47-51) that amorphous indium tin oxide (a-ITO) or indium zinc oxide (IZO) (amorphous transparent conductive film) allows for use of a weak-acid etchant is preferably used as the material of the pixel electrodes so that the aluminum alloy (the electrodes under the pixel electrode) is prevented from being damaged during etching of the pixel electrodes.

Therefore, it would have been obvious to those skilled in the art at the time the invention was made to form an amorphous transparent conductive film used as the pixel electrode in each pixel region as claimed in claim 17 for use of a weak-acid etchant so that the electrodes under the pixel electrode such as aluminum alloy is prevented from being damaged such as erosion during etching of the pixel electrodes and improving the pixel electrode contacting the electrode underneath.

3. Claims 2-5, 9-12, 18-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant admitted prior art and Kaneko as applied to claims 1, 8 and 17 above, and further in view of US 5,135,581 (Tran et al).

Claims 2-5, 9-12, 18-22, Kaneko discloses (col.5, lines 47-51) that amorphous indium tin oxide (a-ITO) or indium zinc oxide (IZO) (amorphous transparent conductive film) allows for use of a weak-acid etchant is preferably used as the material of the pixel electrodes so that the aluminum alloy (the electrodes under the pixel electrode) is prevented from being damaged during etching of the pixel electrodes. Tran discloses (col.2, line 20 – col.3, line 5) that a process for forming a light transmissive electrically conductive composition at a temperature from 20°C to 300°C and sputtering occurs in a gaseous mixture comprising a sputtering gas and a stabilizing gas such as H₂ or H₂O.

Art Unit: 2871

The pixel electrode made from amorphous ITO or IZO also is a light transmissive conductive composition. Tran indicates (col.2, line 20 – col.3, line 5) that such forming process at the temperature from 20°C to 300°C and containing such stabilizing gas H₂ or H₂O advantageously reduces the visible light absorption and renders more stable. Based on the prior art disclosed the temperature range, the skilled in the art would perform a suitable temperature range such as 150°C to 350°C, and that would have been at least obvious.

Therefore, it would have been obvious to those skilled in the art at the time the invention was made to use amorphous ITO or amorphous IZO forming the pixel electrode at a predetermined temperature and adding H₂ or H₂O as claimed in claims 2-5, 9-12 and 18-22 for reducing the visible light absorption and achieving more stable characteristics.

4. Claims 6-7,13-16 and 23-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant admitted prior art and Kaneko as applied to claims 1, 8 and 17 above, and further in view of Us 0029054 (Maeda et al).

Claims 6, 15 and 23, Maeda discloses (paragraphs 0100 – 0105) that the thickness of the transparent conductive thin film (such as the amorphous ITO film to form the pixel electrode) is preferably 50 to 200 nm (500 Å to 2000 Å) to prevent coloring caused by interference. Therefore, it would have been obvious to those skilled in the art at the time the invention was made to form the pixel electrode as claimed in claim 6, 15 and 22 for preventing the coloring cause by interference.

Claims 7, 16 and 24, Applicant admitted prior art discloses (paragraph 24) that the pixel electrodes also can be formed of polycrystal ITO and having a thickness of 500 Å.

Claims 13-14, Applicant admitted prior art discloses (paragraphs 05 – 26; Figs.1-2) that using metal film such as Cu or Ti to form the gate electrode (2a), and the data line is connected to the drain electrode (also made from conductive metal) so that using a same metal as a data line that would simplify the making process. Therefore, it would have been obvious to those skilled in the art at the time the invention was made to use same metal material as the gate electrode and as a data line as claimed in claims 13-14 for simplifying the making process.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.


6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mike Qi whose telephone number is (703) 308-6213.

Application/Control Number: 10/029,145
Art Unit: 2871

Page 8

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Mike Qi
March 14, 2003


ROBERT H. KIM
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